ABSTRACT OF THE DISCLOSURE

A virtual assembly design environment that simulates axial and planar constrained motion for multiple parts in any combination and application order. Dynamic simulation methods are used to simulate object behavior in the design environment using physical laws and collision detection algorithms. The physical properties, e.g., mass properties, of parts in an assembly are created in a separate CAD system. In one embodiment, physical property information is transferred from the CAD system to the virtual reality environment where it is used in dynamic simulations. The parts behave realistically in a user's hand, constrained on the base part, or moving freely in space. A swept volume can be generated directly in the CAD system. Real-time bi-directional data transfer between a VR environment and the CAD system is also provided. As a result, the user can perform parametric design modifications in the virtual environment by the use of a CAD system.